

How to Develop Leadership in The Context of Manufacturing?

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Abstract: The study aims to replicate an earlier study and answer a research question: how to develop leadership in the real-life context of a Russian manufacturing organization. A 16-calendar week quasi-experiment with pre-and post-test design in a real-life context of a Russian manufacturing organization, involving three levels of managers, using MLQ with specified effectiveness criteria was conducted. The author acted as an immersed researcher. The results indicate that contextualization of leadership development intervention delivered a statistically significant shift in managers' leadership styles and effectiveness with small to large effect sizes with a perspective of ensuring the sustainability of results. External validity of the study is ensured by replication of an earlier conducted study, method of "how to develop leadership in the real-life context" was explained, which can be replicated. Previously no similar studies were conducted in the hardware manufacturing industry of Russia, with the reported contextualization and explanation of "how to...". Other studies of the same design and similar contexts are needed, transformational, environmental and social criteria could be added to the evaluation of effectiveness.

Keywords: leadership development, MLQ, quasi-experiment, Russia, transformational leadership.

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INTRODUCTION

The challenging global context requires businesses to focus on the sustainability of their performance with consideration of environmental and social aspects (Leniwati et al., 2023; Zopounidis & Lemonakis, 2024). Leadership is focused on the achievement of common goals via the utilization of social influence (Liden et al., 2025). Businesses around the world recognize the impact it has on their performance and invest in the development of leadership more than \$366 billion annually (Hieker & Pringle, 2021; Kast & Rosenzweig, 1972; Lantu et al., 2021; Martin et al., 2021), which is also supported by researchers and practitioners (Jacobsen et al., 2021).

Training and development are systemic practices of strategic human resource management that are focused on the pursuit of the sustainability of performance (Griep et al., 2024; Hubais et al., 2023; Rehman et al., 2021; Stankevičiute & Savanevičiene, 2018) expressed in the achievement of long-term economic, environmental, and social organizational goals without compromising future generations on the achievement of their goals (Apascaritei & Elvira, 2022; Brundtland, 1987; Jones et al., 2017; Piwowar-Sulej, 2021; Peters, 2024; Silveira Ramalho & de Fátima Martins, 2022; Uysal, 2020).



Systemic human resource development interventions are a set of formal and informal learning, coaching, and mentoring activities focused on the improvement of competencies, expanding capability and capacity in dealing with contextual challenges, the success of which is measured using objective performance criteria (Shayegan et al., 2022). Development interventions of different level managers that are managing internal resources can help to ensure the sustainability and stability of effective performance (Gričnik et al., 2023; Gürol et al., 2024; Hieker & Pringle, 2021; Zen, 2023) by application of tools and methods that motivate and guide subordinates through a period of transformation and challenge, increase loyalty and environmental friendliness (Sopiah et al., 2024; Averina et al., 2023; Khan et al., 2023).

The success of such interventions is subject to the utilization of a theoretical foundation, contextualization, and consideration of the needs of managers, organizations, industry, culture, as well as their reproducibility and replicability with an objective evaluation of results (Avolio, 2011; Bolden, 2005; Day, 2014; Day & Thornton, 2018; Holman, 2000; Moldoveanu & Narayandas, 2019; Vogel et al., 2020; Zeerak, 2022). Popular tools, best practices, and approaches used nowadays by field-dominating practitioners do not meet the mentioned criteria for successful development (Day & Thornton, 2018; Li et al., 2021; Moldoveanu & Narayandas, 2019).

Full Range Leadership Development (FRLD) – an approach based on Transformational leadership theory (Bass & Avolio, 2018) is suggested to be used as a theoretical foundation for ensuring effective leadership (Avolio, 2011; Ntlhanngoe & Chipunza, 2021). Guiding principles of leadership development (Gosling & Mintzberg, 2004) when applied to the FRLD approach (Bass & Avolio, 2018) highlight several research gaps. First, the dependence of leadership on culture and context cannot be ignored (Lord, 2019; Zeerak, 2022), non-western cultures and contexts with a specification of organizational needs and issues that would allow to facilitate development need to be researched more (Avolio, 2011; Bolden, 2005; Holman, 2000; Mhatre & Riggio, 2014; Moldoveanu & Narayandas, 2019). Next, participation in the development intervention should be strictly limited to persons who hold actual leadership positions, representing organizational context and setting, such as multiple levels of structure and function, problem areas (Lord, 2019; Nijstad, 2009), which would enable required interactions and solve practical problems of the organization (Avolio et al., 2009; Lord, 2019; Vogel et al., 2020). Also, the Multifactor Leadership Questionnaire (MLQ 5X – short form)) needs to be used for measurement of leadership styles, which is the most widely accepted tool, where employees are filling out the MLQ without specification of effectiveness criteria (Bass & Avolio, 2004; Bass & Riggio, 2006; Lord, 2019) that creates a risk of subjectivity since employees-evaluators might not be aware of the constructs of leadership, think of leadership in general, think of episodes during the evaluation, which could result in a common method bias (Jacquart et al., 2018; Lord, 2019; Lowe et al., 1996). Evaluations need to be done by those, who are aware of the leadership constructs, keep context in mind (Antonakis et al., 2004; Lord, 2019; Mhatre & Riggio, 2014), specify the objective effectiveness criteria (Bass & Avolio, 2004; Lord, 2019), and are not influenced by the authority of the leaders that are being evaluated (Grachev et al., 2007). Immersed researchers could be used for such evaluations in a real-life context, reducing the risk of a common method bias (Avolio & Bass, 1991; Avolio et al., 2009; Mhatre & Riggio, 2014; Northouse, 2019).

The purpose of the research is to answer the research question: “How to develop leadership in the real-life context of a Russian manufacturing organization?” by replicating a study design conducted earlier (Kravtsuk, 2022) using a quasi-experimental method in a real-life context of a manufacturing company in Russia, involving three levels of management, using specified effectiveness criteria and MLQ as a measurement tool, conducted by immersion of a researcher.

METHODS

Quasi-experimental designs are suggested to be used in the leadership development field because they allow for conducting research in a real-life context, where assignment of participants does not have to be random and small sample sizes can be used, also the design allows for testing for causality by influencing independent variables and evaluating the outcomes (Avolio et al., 2009; Chiang et al., 2015; Marsden & Torgerson, 2012; Nunan, 1992; Rogers & Révész, 2019), explanation of how leadership was influenced is also possible (Day & Thornton, 2018; Hackman, 2012). Quasi-experiments with pre-and post-test designs do not need to utilize control groups since the pre-test provides necessary control data (Harris et al., 2006). The author attempted to replicate a study conducted in a Russian mining environment using a pre-and post-test quasi-experimental design (Kravtsuk, 2022).

The research was conducted in 2018 in a hardware manufacturing company in Russia, selected based on convenience. The general manager of the company provided necessary data on the production process with a list of management at all organizational levels, which influenced the process. The list was reviewed and only those managers who did not participate in any leadership development programs and held leadership roles for the past 12 months, were selected for participation in the research. Selection of the sample using explained criteria allowed to minimize history and maturation risks for internal validity (Chiang et al., 2015). A sample consisted of 15 managers from different levels of production, maintenance, and quality functions: 3 executives (20.0%), 5 middle managers (33.3%), and 7 supervisors (46.7%).

To ensure a better understanding of the real-life situation and results, the culture, industry, organization and management contexts of multiple levels should be explained (Moldoveanu & Narayandas, 2019; Oc & Carpin, 2023; Vogel et al., 2020). Russia is a multinational and multicultural country with a rich history, it is the largest country on the globe, extends from Europe to Asia, has direct access to the Arctic and Pacific oceans, and Baltic, Black, and Caspian seas (Finlayson, 2019; Hosking et al., 2023). Russia was included in the GLOBE cross-cultural study of organizational leadership (Grachev et al., 2007). The research involved a survey of 450 middle managers from the telecommunications, financial services, and food processing industries in Russia. According to the findings, Russian culture is becoming more individualistic as opposed to collectivistic. Authority figures and those with privileges are eminently respected. People require direction and security during changes, stability is immensely important. Managers require more assertiveness for the survival and transformation of firms, but it is not always possible due to different asymmetries. Russian managers excel at networking and collaboration, leveraging formal and informal relationships. There is a mix of socially responsible businesses and those that ignore it.

The hardware industry is dependent on the global environment and other industries, such as infrastructure and transportation, construction, mechanical engineering, and others. In 2008–2009 the industry experienced a reduction of demand, which led to a more than 50% cut in selling prices, a stabilization of the situation was observed in 2018–2019 when levels of 2007 were reached (MegaResearch, 2020). Industry requires significant investment (Zhuravlyov, 2019), high competition demands management to speed up the modernization of production capacities and increase the variety of products (Selyutina, 2019).

The company produced different hardware, total headcount was approximately 350 full-time employees. Major problems were related to a high level of equipment downtime and insufficient production plan attainment. Operations were organized in 1 shift, 5 days per week. There were no changes in the organizational

structure and technology for at least 12 previous months, which significantly reduced the risks for the internal validity of the study, such as the history and maturation of leadership styles application and effectiveness (Chiang et al., 2015).

Executives worked at the company for all their lives. There was a clear understanding that changes were needed, but internal alignment was lacking. Implementation of changes was slow and difficult due to the conservative and passive attitude among some of the managers on all levels. Major cooperation problems occurred between the representatives of production and maintenance. Frequent changes in the production plan, lack of standardization and control led to frequent breakdowns that were not reported properly, so the root causes were not identified, thus elimination and prevention were not possible. The level of supervisory paperwork was high, but unusable due to its format and quality. Overview of the work processes and their control were missing, defected output was frequent. Supervisors could assign workers to do random work to keep them busy.

Leadership styles and effectiveness were measured using the Rater MLQ form (5X - short form) which is built up of 45 questions grouped by categories of leadership styles, extra effort, effectiveness, and satisfaction using a 5-point Likert scale (Bass & Riggio, 2006): 0 = not at all, 1 = once in a while, 2 = sometimes, 3 = fairly often, 4 = frequently, if not always. The form used allows associates of leaders to do the evaluation. The form was used to conduct interviews and collect data (Bass & Avolio, 2004; Mind Garden, 2023), 40 questions applicable to the research were answered: 36 questions on leadership styles, and 4 questions on effectiveness. Interviewees provided evidence sample reports, meeting logs, standards, procedures, and described situations. Indicators specified in the accountabilities of management served as objective effectiveness criteria: executives – EBIT, production and maintenance cost; middle managers – productivity, equipment availability and reclamations; supervisors – a volume of appropriate quality and downtime.

Quantitative analysis was done on the MLQ data. Consistency and reliability were verified by Cronbach's alfa reliability, used in leadership-related studies (Hur-yagba, 2016; Singh, 2015). A paired samples t-test with effect sizes was calculated and analyzed on the pre-and post-intervention results (McLead, 2019; Swift & Piff, 2014; Thyer, 2012). Analysis of the pre-intervention results allowed for the creation of a leadership development intervention program, which was later implemented, and its results were measured by post-intervention measurement.

The conducted research replicated earlier study design (Kravtsuk, 2022), quasi-experiment with pre-and post-intervention measurements (Chiang et al., 2015; Harris et al., 2006). In the study, an independent variable was used to influence the dependent variable. The independent variable - contextualized leadership development intervention, implemented during the research. Dependent variable - leadership styles and effectiveness of the researched managers. The duration of the research was 16 calendar weeks – sufficient for obtaining reliable data and results evaluation (Arthur & Hardy, 2014). The research was organized in the following way: pre-intervention (calendar weeks 1-2), intervention (calendar weeks 3-14), post-intervention (calendar weeks 15-16).

Pre-intervention

Individual 2-hour MLQ interviews with 15 managers were done to undertake the pre-intervention measurement of leadership styles and effectiveness, totaling 30 hours of interviews. Effectiveness was measured using objective criteria. Consistency and reliability of the MLQ measurements were verified by Cronbach's alpha reliability test conducted using the IBM SPSS Statistics version 28 software. The results were organized into 4 groups: overall sample, executives, middle managers, and supervisors, which allowed to understand the starting position.

Intervention

The results of the pre-intervention measurements by the group were analyzed, the intervention program was developed and implemented. Program participation was compulsory for the earlier chosen managers. The program was built up of 4 training and 4 problem-solving workshops.

Each training workshop lasted 4 hours, totaling 16 hours of training. The following topics were discussed: one session on leadership and effectiveness (Bass & Bass, 2008; Bass & Riggio, 2006; Nijstad, 2009), one session on the Full Range of Leadership Model (Bass & Avolio, 2018; Hur-yagba, 2016) and self-analysis, two sessions on tools to sustain required leadership styles (Jaques, 2010; Liker, 2019).

Each problem-solving workshop lasted 4 hours, totaling 16 hours. The following topics were worked on goal setting and communication to enable internal alignment, planning and task assignment, standardization, monitoring and analysis of performance, review meetings. As a result of the problem-solving workshops improvements were developed, agreed and executed.

Individual 1-hour coaching sessions were held with all the participants after each training and workshop, totaling 120 hours of coaching. Weekly monitoring and analysis of performance was done. Results were reviewed and necessary actions were implemented.

Post-intervention

Individual 2-hour MLQ interviews with 15 managers were repeated to undertake the post-intervention measurement, totaling 30 hours of interviews. Effectiveness was measured using objective criteria. The consistency and reliability of the MLQ measurements were repeatedly verified by Cronbach's alpha reliability test. The results were organized into 4 groups: overall sample, executives, middle managers, and supervisors. Conducted measurements allowed to understand the post-intervention state.

To determine the change that occurred due to the intervention, post-intervention results were compared to the pre-intervention results using a paired samples t-test. All the testing was done using IBM SPSS Statistics version 28 software.

The author – an associate of the managers, immersed external, independent researcher who cooperated with internal people in conducting the study (Bass & Avolio, 2004; Herr & Anderson, 2015). The approach was selected given the peculiarity of Russian culture that promotes respect for those in positions of power (Grachev et al., 2007). The power of the managers did not extend to the researcher, so objective evaluations were done. The author executed all of the activities described in the current paper.

RESULTS AND DISCUSSION

A quasi-experiment was executed in the real-life context of a manufacturing company in Russia, involving three levels of management, using specified effectiveness criteria and MLQ as a measurement tool. The study was conducted by an immersed researcher. Internal reliability and consistency demonstrated by the study ranged from 0,832 during pre-intervention to 0,775 during post-intervention MLQ evaluation.

To ensure leadership development in the real-life context, managers went through training and problem-solving workshops with coaching. The following was completed: goals were set, communicated, and included in the planning of all levels, several standards were implemented - task assignment, shift change, issues collection with root cause analysis and action taking, weekly cross-functional planning and performance review meetings; priority product list for standards revision was prepared and started.

Overall group, the intervention showed positive paired samples t-test results, aligned with previous research results (Avolio et al., 2009; Kravtsuk, 2022) reaching statistically significant changes at $p = 0,05$ with medium effect size in *laisses-faire*, passive and active management by exception and contingent reward, and small effect size in intellectual stimulation, inspirational motivation, individual consideration, and idealized influence styles; effectiveness reported medium effect size (Table 1). It is important to note that statistical significance is dependent on the sample size and might be not achievable in the real-life context, so effect size is more representative as it is independent of the sample size (Sullivan & Feinn, 2012). FRL model suggests that all styles are used to some extent depending on the context (Bass & Riggio, 2014), which is confirmed by the current study. Improvement of competencies of leaders in dealing with contextual challenges implemented during the intervention (Gričnik et al., 2023; Gürol et al., 2024; Hieker & Pringle, 2021; Shayegan et al., 2022; Zen, 2023) helped to reduce passive and increase active management by exception leadership style utilization, higher utilization of active management by exception leadership style could be driven by a need for certainty in day-to-day operations during the period of transformation (Sopiah et al., 2024; Averina et al., 2023; Poturak et al., 2020; Khan et al., 2023), which increased cooperation and support between the leaders and is aligned with the GLOBE study results (Grachev et al., 2007).

Table 1 Overall sample - paired samples t-test

Paired Samples Statistics				Paired Samples Test			Paired Samples Effect Sizes				
Leadership styles/ Effectiveness		M	N	SD	t	df	Sign. 2-p	Standardizer ^a	95% CI		
									Low	Up	
Pair 1	LF: POST	0.97	15	0.23	-7.34	14	0.00	Cohen's d	0.28	-2.74	-1.02
	LF: PRE	1.50	15	0.31				Hedges' c	0.29	-2.67	-1.00
Pair 2	MBE - P: POST	1.05	15	0.27	-5.32	14	0.00	Cohen's d	0.39	-2.08	-0.65
	MBE - P: PRE	1.58	15	0.29				Hedges' c	0.40	-2.02	-0.63
Pair 3	MBE - A: POST	1.62	15	0.28	3.57	14	0.00	Cohen's d	0.36	0.30	1.52
	MBE - A: PRE	1.28	15	0.30				Hedges' c	0.37	0.29	1.48
Pair 4	CR: POST	1.45	15	0.30	4.14	14	0.00	Cohen's d	0.27	0.42	1.70
	CR: PRE	1.17	15	0.35				Hedges' c	0.27	0.41	1.65
Pair 5	Int. Stim.: POST	1.43	15	0.36	5.53	14	0.00	Cohen's d	0.14	0.69	2.14
	Int. Stim.: PRE	1.23	15	0.41				Hedges' c	0.14	0.67	2.08
Pair 6	Ins. Mot.: POST	1.23	15	0.36	4.58	14	0.00	Cohen's d	0.17	0.50	1.84
	Ins. Mot.: PRE	1.03	15	0.41				Hedges' c	0.17	0.49	1.79
Pair 7	Ind. Con.: POST	1.30	15	0.42	3.50	14	0.00	Cohen's d	0.13	0.29	1.50
	Ind. Con.: PRE	1.18	15	0.48				Hedges' c	0.13	0.28	1.46
Pair 8	II BEH: POST	1.25	15	0.40	4.18	14	0.00	Cohen's d	0.15	0.43	1.71
	II BEH: PRE	1.08	15	0.41				Hedges' c	0.16	0.41	1.66
Pair 9	II ATR: POST	1.23	15	0.41	3.06	14	0.01	Cohen's d	0.13	0.20	1.36
	II ATR: PRE	1.13	15	0.45				Hedges' c	0.13	0.19	1.32
Pair 10	Effect.: POST	1.53	15	0.19	8.12	14	0.00	Cohen's d	0.28	1.17	3.01
	Effect.: PRE	0.95	15	0.22				Hedges' c	0.29	1.13	2.92

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Source: Composed by the author.

The paired samples t-test of the executives showed statistically significant change at $p=0,05$ only at passive management by exception and effectiveness. The medium effect size was achieved at laissez-faire and passive management by exception indicating that the change was visible (Sullivan & Feinn, 2012) (Table 2). The rest of the leadership styles and effectiveness demonstrated small effect sizes. A detailed view of the leadership styles exhibited by executives confirms the utilization of a full range of styles (Bass & Riggio, 2014) where training, coaching and practical problem solving allowed to reduce utilization of ineffective leadership styles and increase utilization of more effective styles (Gričnik et al., 2023). A higher utilization on active management by exception leadership style could be driven by a need for certainty in day-to-day operations during transformation (Sopiah et al., 2024; Averina et al., 2023; Poturak et al., 2020; Khan et al., 2023). Also, executives realized that effectiveness improvement is not possible unless goals are agreed upon, incorporated into all plans and executed, which led to a gradual increase in cooperation and is aligned with earlier research (Grachev et al., 2007; Kravtsuk, 2022).

Table 2 Executives - paired samples t-test

Paired Samples Statistics				Paired Samples Test			Paired Samples Effect Sizes				
Leadership styles/ Effectiveness		M	N	SD	t	df	Sign. 2-p	Standardizer ^a	95% CI		
									Low	Up	
Pair 1	LF: POST	1.08	3	0.38	-3.46	2	0.07	Cohen's d	0.25	-4.11	0.14
	LF: PRE	1.58	3	0.52				Hedges' c	0.31	-3.28	0.11
Pair 2	MBE - P: POST	1.17	3	0.29	-5.20	2	0.04	Cohen's d	0.25	-5.94	-0.14
	MBE - P: PRE	1.92	3	0.14				Hedges' c	0.31	-4.74	-0.11
Pair 3	MBE - A: POST	1.67	3	0.14	2.00	2	0.18	Cohen's d	0.14	-0.44	2.64
	MBE - A: PRE	1.50	3	0.25				Hedges' c	0.18	-0.35	2.11
Pair 4	CR: POST	1.75	3	0.25	1.00	2	0.42	Cohen's d	0.14	-0.72	1.77
	CR: PRE	1.67	3	0.38				Hedges' c	0.18	-0.58	1.41
Pair 5	Int. Stim.: POST	1.67	3	0.58	2.00	2	0.18	Cohen's d	0.14	-0.44	2.64
	Int. Stim.: PRE	1.50	3	0.66				Hedges' c	0.18	-0.35	2.11
Pair 6	Ins. Mot.: POST	1.58	3	0.38	1.00	2	0.42	Cohen's d	0.14	-0.72	1.77
	Ins. Mot.: PRE	1.50	3	0.43				Hedges' c	0.18	-0.58	1.41
Pair 7	Ind. Con.: POST	1.58	3	0.52	1.00	2	0.42	Cohen's d	0.14	-0.72	1.77
	Ind. Con.: PRE	1.50	3	0.43				Hedges' c	0.18	-0.58	1.41
Pair 8	II BEH: POST	1.67	3	0.38	1.00	2	0.42	Cohen's d	0.14	-0.72	1.77
	II BEH: PRE	1.58	3	0.52				Hedges' c	0.18	-0.58	1.41
Pair 9	II ATR: POST	1.58	3	0.29	1.00	2	0.42	Cohen's d	0.14	-0.72	1.77
	II ATR: PRE	1.50	3	0.43				Hedges' c	0.18	-0.58	1.41
Pair 10	Effect.: POST	1.67	3	0.14	7.00	2	0.02	Cohen's d	0.14	0.38	7.90
	Effect.: PRE	1.08	3	0.14				Hedges' c	0.18	0.30	6.30

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Source: Composed by the author.

The same t-test for the middle managers showed that statistical significance at $p = 0.05$ was reached at laissez-faire, passive management by exception, contingent reward, inspirational motivation and effectiveness with medium effect sizes, and intellectual stimulation showed small effect size. Active management by exception was statistically insignificant at $p = 0.05$ but had a medium effect size. The rest of the leadership styles showed statistically insignificant results at $p = 0.05$ with small effect sizes (Table 3), also confirming utilization of the full range of leadership styles (Bass & Riggio, 2014). Executives changed a paradigm of internal culture of cooperation, which forced middle managers to increase activeness, paying more attention to problems, their root causes and their prevention, which is also aligned with previous studies (Grachev et al., 2007; Kravtsuk, 2022; Nguyen et al., 2023).

Table 3 Middle managers - paired samples t-test

Paired Samples Statistics				Paired Samples Test			Paired Samples Effect Sizes				
Leadership styles/ Effectiveness		M	N	SD	t	df	Sign. 2-p	Standardizer ^a	95% CI		
									Low	Up	
Pair 1	LF: POST	1.00	5	0.25	-4.81	4	0.01	Cohen's d	0.21	-3.81	-0.45
	LF: PRE	1.45	5	0.21				Hedges' c	0.23	-3.44	-0.41
Pair 2	MBE - P: POST	1.05	5	0.33	-4.00	4	0.02	Cohen's d	0.22	-3.24	-0.28
	MBE - P: PRE	1.45	5	0.21				Hedges' c	0.25	-2.92	-0.25
Pair 3	MBE - A: POST	1.70	5	0.21	2.24	4	0.09	Cohen's d	0.50	-0.14	2.07
	MBE - A: PRE	1.20	5	0.37				Hedges' c	0.55	-0.12	1.87
Pair 4	CR: POST	1.45	5	0.27	3.09	4	0.04	Cohen's d	0.33	0.07	2.62
	CR: PRE	1.00	5	0.25				Hedges' c	0.36	0.07	2.36
Pair 5	Int. Stim.: POST	1.40	5	0.38	3.16	4	0.03	Cohen's d	0.18	0.09	2.67
	Int. Stim.: PRE	1.15	5	0.42				Hedges' c	0.20	0.08	2.41
Pair 6	Ins. Mot.: POST	1.25	5	0.31	3.21	4	0.03	Cohen's d	0.21	0.10	2.70
	Ins. Mot.: PRE	0.95	5	0.37				Hedges' c	0.23	0.09	2.44
Pair 7	Ind. Con.: POST	1.25	5	0.50	2.45	4	0.07	Cohen's d	0.14	-0.08	2.20
	Ind. Con.: PRE	1.10	5	0.58				Hedges' c	0.15	-0.07	1.99
Pair 8	II BEH: POST	1.15	5	0.34	2.45	4	0.07	Cohen's d	0.14	-0.08	2.20
	II BEH: PRE	1.00	5	0.25				Hedges' c	0.15	-0.07	1.99
Pair 9	II ATR: POST	1.15	5	0.49	1.63	4	0.18	Cohen's d	0.14	-0.31	1.70
	II ATR: PRE	1.05	5	0.48				Hedges' c	0.15	-0.28	1.54
Pair 10	Effect.: POST	1.40	5	0.14	3.67	4	0.02	Cohen's d	0.27	0.21	3.01
	Effect.: PRE	0.95	5	0.33				Hedges' c	0.30	0.19	2.72

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Source: Composed by the author.

The results of t-test for supervisors indicated that the change was statistically significant at $p=0.05$ at all leadership styles and effectiveness, except for individual consideration and attributed idealized influence;

however, medium effect sizes were achieved only at laissez-faire, active management by exception leadership styles and effectiveness, while passive management by exception had large effect size (Table 4). The rest of the leadership styles had small effect sizes. A full range of styles utilization was observed (Bass & Riggio, 2014) and, similarly to the other groups, development helped to reduce ineffective and increase effective leadership styles utilization. Cultural changes were observed when subordinates started to mirror behavior and act in accordance with the shared values and beliefs of their management (Kravtsuk, 2022; Nguyen et al., 2023).

Table 4 Supervisors - paired samples t-test

Paired Samples Statistics				Paired Samples Test			Paired Samples Effect Sizes				
Leadership styles/ Effectiveness		M	N	SD	t	df	Sign. 2-p	Standardizer ^a	95% CI		
									Low	Up	
Pair 1	LF: POST	0.89	7	0.13	-4.60	6	0.00	Cohen's d	0.35	-2.93	-0.50
	LF: PRE	1.50	7	0.32				Hedges' c	0.37	-2.74	-0.47
Pair 2	MBE - P: POST	1.00	7	0.25	-2.79	6	0.03	Cohen's d	0.51	-1.97	-0.09
	MBE - P: PRE	1.54	7	0.30				Hedges' c	0.54	-1.84	-0.08
Pair 3	MBE - A: POST	1.54	7	0.37	2.49	6	0.05	Cohen's d	0.30	0.01	1.82
	MBE - A: PRE	1.25	7	0.25				Hedges' c	0.32	0.01	1.70
Pair 4	CR: POST	1.32	7	0.28	3.24	6	0.02	Cohen's d	0.20	0.20	2.20
	CR: PRE	1.07	7	0.19				Hedges' c	0.22	0.18	2.06
Pair 5	Int. Stim.: POST	1.36	7	0.24	3.87	6	0.01	Cohen's d	0.12	0.34	2.53
	Int. Stim.: PRE	1.18	7	0.28				Hedges' c	0.13	0.32	2.37
Pair 6	Ins. Mot.: POST	1.07	7	0.31	3.87	6	0.01	Cohen's d	0.12	0.34	2.53
	Ins. Mot.: PRE	0.89	7	0.32				Hedges' c	0.13	0.32	2.37
Pair 7	Ind. Con.: POST	1.21	7	0.34	2.12	6	0.08	Cohen's d	0.13	-0.09	1.64
	Ind. Con.: PRE	1.11	7	0.43				Hedges' c	0.14	-0.08	1.54
Pair 8	II BEH: POST	1.14	7	0.38	3.29	6	0.02	Cohen's d	0.17	0.21	2.23
	II BEH: PRE	0.93	7	0.31				Hedges' c	0.18	0.19	2.08
Pair 9	II ATR: POST	1.14	7	0.35	2.12	6	0.08	Cohen's d	0.13	-0.09	1.64
	II ATR: PRE	1.04	7	0.42				Hedges' c	0.14	-0.08	1.54
Pair 10	Effect.: POST	1.57	7	0.19	5.73	6	0.00	Cohen's d	0.31	0.74	3.55
	Effect.: PRE	0.89	7	0.13				Hedges' c	0.33	0.69	3.32

a. The denominator used in estimating the effect sizes. Cohen's d uses the sample standard deviation of the mean difference. Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Source: Composed by the author.

CONCLUSION

The current study's purpose was to answer the research question: "How to develop leadership in the context of a Russian manufacturing organization?" by replicating an earlier study design: a 16-calendar week quasi-experimental study with pre-and post-intervention design in a real-life context of a Russian manufacturing

organization, involving three levels of managers, using MLQ for measurement of leadership styles and effectiveness with specific criteria, where author acted as an immersed researcher. The results of the study indicate that using systemic approach to human resource development intervention, utilized a set of formal and informal training, coaching, and problem-solving activities for the improvement of competencies, expansion of capability and capacity of research participants in dealing with contextual challenges allowed to achieve a statistically significant shift in the managers' leadership styles and effectiveness with small to large effect sizes. The transformation of the leadership styles supported by the contextual and cultural changes also started to take place and managers of all levels were more inclined to utilize similar tools, behaviors, sharing common beliefs and values, delivering positive results with a perspective of sustainability. The study has several limitations and future research opportunities. The quasi-experiment was conducted by an immersion of a researcher in a real-life context, in Russian culture, within the specific industrial, organizational, and managerial setting, which could be difficult to replicate. To further increase the external validity of the research, other studies of the same design and similar contexts are needed. The duration of the study could also be amended. Used study design is suitable for the cultural context and allows for the reduction of a common method bias risk. At the same time, the objective effectiveness criteria were transactional-economic based, so transformational, environmental and social criteria could be included.

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